

**What is claimed is:**

1. A plant-produced immunoglobulin, wherein the immunoglobulin has a glycopeptide profile comprising a least one glycopeptide which lacks fucose.  
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2. The immunoglobulin of claim 1, wherein the at least one glycopeptide comprises an asparagine (Asn) residue.
3. A plant-produced heavy chain (HC) or light chain (LC) of an  
10 immunoglobulin, wherein the HC or LC has a glycopeptide profile comprising at least one glycopeptide which lacks fucose.
4. The HC of claim 3, wherein the at least one glycopeptide comprises an asparagine (Asn) residue in the CH2 region.  
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5. A plant-produced immunoglobulin, wherein the immunoglobulin has a free glycan profile comprising a least one glycan which lacks fucose.
6. The immunoglobulin of claim 5, wherein the immunoglobulin  
20 comprises an asparagine (Asn) residue.
7. The immunoglobulin of claim 5, wherein the glycan profile is the same as or substantially the same as that provided in Figure 12.
- 25 8. The immunoglobulin of claim 5, wherein the glycan is selected from the group consisting of 3Man, 2GlcNAc, 1Xyl; 2 Man, 2GlcNAc, 1Xyl; 3Man, 3GlcNAc, 1Xyl; 3Man, 2GlcNAc; 3Man, 3GlcNAc; 4Man, 2GlcNAc; 5 Man, 2GlcNAc; and 6Man, 2GlcNAc, wherein Man = Mannose, GlcNAc = N-acetylglucosamine and Xyl = xylose.  
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9. The immunoglobulin of claim 5, wherein the glycan is 3Man, 2GlcNAc, 1Xyl or 2 Man, 2GlcNAc, 1Xyl, wherein Man = Mannose, GlcNAc = N-acetylglucosamine and Xyl = xylose.
- 5 10. The immunoglobulin of claim 5, wherein the glycan profile is the same as or substantially the same as one of the glycan profiles provided in Figure 16.
- 10 11. The immunoglobulin of claim 5, wherein the glycan is selected from the group consisting of H2N2X; H3N2; and H3N2X, wherein H = hexose, N = HexNAc = N-acetylhexose and X = xylose.
- 15 12. The immunoglobulin of claim 5, wherein the glycan is selected from the group consisting of N2H8; N2H3X; N2H3X; N2H4X; N2H5; N2H6; N2H7; N2H8; N3H3X; N2H4; and N2H5, wherein H = hexose, N = HexNAc = N-acetylhexose and X = xylose.
- 20 13. The immunoglobulin of claim 11 or claim 12, wherein the hexose is mannose and the N-acetylhexose is N-acetylglucosamine.
- 25 14. The immunoglobulin of claim 1 or claim 5, wherein the immunoglobulin is selected from the group consisting of IgG, IgA, IgM, IgE and IgD.
- 30 15. The immunoglobulin of claim 14, wherein the immunoglobulin is IgA or IgG.
16. The immunoglobulin of claim 14, wherein the immunoglobulin is an IgA antibody with a heavy chain and a light chain.
17. The immunoglobulin of claim 16, wherein the immunoglobulin is an anti-herpes simplex virus antibody.

18. The immunoglobulin of claim 14, wherein the immunoglobulin is an IgG antibody with a heavy chain and a light chain.

19. The immunoglobulin of claim 18, wherein the immunoglobulin is an anti-dual integrin antibody.

20. The immunoglobulin of claim 19, wherein the immunoglobulin is an anti- $\alpha V\beta 3$ ,  $\alpha V\beta 5$  dual integrin antibody.

21. The immunoglobulin of claim 5, wherein the glycan profile is the same as or substantially the same as the glycan profile provided in Figure 19.

22. The immunoglobulin of claim 5, wherein the glycan profile is the same as or substantially the same as the glycan profile provided in Figure 21.

23. The immunoglobulin of claim 5, wherein the glycan profile is the same as or substantially the same as the glycan profile provided in Figure 23.

24. A plant-produced immunoglobulin comprising at least one attached glycan without a terminal fucose.

25. The immunoglobulin of claim 24, wherein the immunoglobulin comprises an asparagine (Asn) residue in the CH2 region.

26. A plant-produced immunoglobulin having a glycan profile which comprises at least one glycan lacking fucose, wherein the glycan profile is determined using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-Tof MS) analysis of free N-linked glycans enzymatically-released from the immunoglobulin.

27. The immunoglobulin of claim 26, wherein the immunoglobulin is IgA.

28. The immunoglobulin of claim 27, wherein the immunoglobulin is an anti-herpes simplex virus antibody.
- 5 29. The immunoglobulin of claim 26, wherein the immunoglobulin is IgG.
30. The immunoglobulin of claim 29, wherein the immunoglobulin is an anti-dual integrin antibody.
- 10 31. The immunoglobulin of claim 30, wherein the immunoglobulin is an anti- $\alpha V\beta 3$ ,  $\alpha V\beta 5$  dual integrin antibody.
32. A plant cell, plant tissue, plant callus, plantlet, whole plant or seed comprising the immunoglobulin of claim 1 or claim 5.
- 15 33. The plant cell, plant tissue, plant callus, or seed of claim 32, wherein the cell, tissue, callus or seed are of a monocotyledonous plant.
34. The plant cell, plant tissue, plant callus, or seed of claim 33, wherein
- 20 the monocotyledonous plant is a maize plant.
35. The plantlet or whole plant of claim 32, wherein the plantlet or whole plant are monocotyledonous.
- 25 36. The plant cell, plant tissue, plant callus, or seed of claim 35, wherein the monocotyledonous plant is a maize plant.
37. The seed of claim 32, wherein the immunoglobulin is located in the endosperm of the seed.
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38. The immunoglobulin of claim 1 or claim 5, wherein the immunoglobulin is a human immunoglobulin.

39. The immunoglobulin of claim 1 or claim 5, wherein the  
5 immunoglobulin comprises a heavy chain lacking a tailpiece.

40. The immunoglobulin of claim 39, wherein the immunoglobulin is an IgA antibody.

10 41. The immunoglobulin of claim 39, wherein the immunoglobulin is an anti-herpes simplex virus antibody.

42. The immunoglobulin of claim 3, wherein the heavy chain of the immunoglobulin lacks a tailpiece.

15 43. The immunoglobulin of claim 42, wherein the immunoglobulin is an IgA antibody.

44. The immunoglobulin of claim 43, wherein the immunoglobulin is an  
20 anti-herpes simplex virus antibody.

45. The immunoglobulin of claim 1 or claim 5, wherein the immunoglobulin is isolated from the plant used to produce the immunoglobulin.

25 46. A monomeric antibody composition comprising at least one glycan having structure number 1 (3Man, 2GlcNAc, 1Xyl) as provided in Figure 12, wherein Man = mannose, GlcNAc – acetylglucosamine and Xyl = xylose.

47. A monomeric antibody composition comprising at least one glycan  
30 having structure number 2 (2Man, 2GlcNAc, 1Xyl) as provided in Figure 12, wherein Man = mannose, GlcNAc – acetylglucosamine and Xyl = xylose.

48. A plant-produced immunoglobulin comprising an amino acid fragment lacking an attached glycan with fucose, wherein the immunoglobulin has an attached glycan with fucose on the same amino acid fragment or on substantially the same amino acid fragment when the immunoglobulin is mammalian-produced.

49. A plant-produced immunoglobulin comprising a glycan profile for a specified amino acid fragment, wherein the immunoglobulin has the same or substantially the same glycan profile for the same amino acid sequence or for substantially the same amino acid fragment when the immunoglobulin is mammalian-produced.

50. A plant-produced immunoglobulin comprising an amino acid fragment having an attached glycan lacking fucose, wherein the immunoglobulin also lacks an attached glycan with fucose on the same amino acid fragment or on substantially the same amino acid fragment when the immunoglobulin is mammalian-produced.

51. A plant-produced immunoglobulin, wherein the immunoglobulin has a free glycan profile comprising a glycan lacking fucose, wherein the immunoglobulin has a free glycan profile comprising the same glycan also lacking fucose when the immunoglobulin is mammalian-produced.

52. The immunoglobulin of claim 48, claim 49, claim 50, or claim 51, wherein the mammalian-produced immunoglobulin is produced in a CHO cell.

53. The immunoglobulin of claim 48, claim 49, claim 50, or claim 51, wherein the plant-produced immunoglobulin is produced in a maize cell and the mammalian-produced immunoglobulin is produced in a CHO cell.

54. A method of producing a transformed plant cell expressing an immunoglobulin having at least one attached glycan without fucose, said method

comprising transforming a plant cell by introducing into the plant cell a single vector comprising a nucleic acid sequence encoding a heavy chain and a light chain of the immunoglobulin, each nucleic acid being operably-linked to a promoter, and culturing the transformed plant cell to produce a plant cell expressing the immunoglobulin  
5 having at least one attached glycan without fucose.

55. The method of claim 54, further comprising isolating the immunoglobulin from the transformed plant cell.

10 56. The method of claim 54, further comprising regenerating transformed plant calli or a transformed whole plant from the transformed plant cell.

57. The method of claim 56, further comprising isolating the immunoglobulin from the transformed plant calli or transformed whole plant.

15 58. The method of claim 54, wherein the sequences for the heavy chain and the light chain are operably-linked to the same promoter.

20 59. The method of claim 54, wherein the sequences for the heavy chain and the light chain are operably-linked to a different promoter.

60. The method of claim 54, wherein the promoter is a constitutive promoter.

25 61. The method of claim 60, wherein the constitutive promoter is a 35S CaMV promoter or a maize ubiquitin-1 promoter.

62. The method of claim 54, wherein the promoter is a seed-specific promoter.  
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63. The method of claim 54, wherein the promoter is an endosperm-specific promoter.

64. The method of claim 54, wherein the vector is selected from the group  
5 consisting of pDAB8505; pDAB1472; pDAB1473; pDAB1474; and pDAB1475.

65. A vector selected from the group consisting of pDAB8505; pDAB1472; pDAB1473; pDAB1474; and pDAB1475.

10 66. The method of claim 54, wherein the plant cell is transformed using an agrobacterium-mediated transformation method or a WHISKERS™ transformation method.

67. A method of producing an isolated a monomeric anti-herpes simplex  
15 virus antibody comprising: (i) introducing into a plant cell nucleic acids having either SEQ ID NO: 1 or either SEQ ID NO: 5 and SEQ ID NO: 9 or SEQ ID NO: 13, each of which is operably-linked to a promoter, to produce a transformed plant cell; (ii) culturing the transformed plant cell to express the introduced nucleic acids; and (iii) isolating the monomeric anti-herpes simplex virus antibody produced by the plant  
20 cell.

68. The method of claim 67 further comprising regenerating a transformed plant from the transformed plant cell.

25 69. A nucleic acid molecule comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 15 (pDAB635); SEQ ID NO: 16 (pDAB16); SEQ ID NO: 17 (pDAB637); SEQ ID NO: 84 (pDAB3014); and SEQ ID NO: 85 (pDAB8505).

30 70. An isolated nucleic acid molecule comprising a nucleic acid sequence encoding the amino acid encoded by SEQ ID NO: 10 or SEQ ID NO: 14.



71. An isolated nucleic acid molecule comprising SEQ ID NO: 1 or SEQ ID NO: 5.
- 5 72. An isolated nucleic acid molecule comprising SEQ ID NO: 9 or SEQ ID NO: 13.
73. An isolated vector or plasmid comprising SEQ ID NO: 1 or SEQ ID NO: 5.
- 10 74. An isolated nucleic acid molecule comprising a nucleic acid sequence encoding the amino acid encoded by SEQ ID NO: 2 or SEQ ID NO: 6.
- 15 75. The immunoglobulin of claim 1, wherein the immunoglobulin comprises a heavy chain comprising the amino acid sequence of SEQ ID NO: 6.
76. The immunoglobulin of claim 1, wherein the immunoglobulin comprises a light chain comprising the amino acid sequence of SEQ ID NO: 14.
- 20 77. An isolated vector or plasmid comprising SEQ ID NO: 9 or SEQ ID NO: 13.